Sextant Observations of Comets Fabry and Barnard.

(*Communicated by Captain H. Toynbee.*)

Comet Fabry.

Observations made on board the ship "Earl of Shaftesbury," by Captain Wm. Randall.

1886, May 5, P.M. ($9^h\ 1^m\ 30^s$ G.M.T.), Lat. 4° 12′ N. Long. 22° 0′ W.

Nucleus of Comet to *Sirius*	13	50	
„ „ *Bellatrix*	23	54	

1886, May 7 : $8^h\ 24^m\ 4^s$ Astronomical G.M.T. Lat. 3° 36′ N.; Long. 20° 0′ W.

Nucleus to *Sirius*	8°	23′	20″
„ „ *Bellatrix*	30	34	

Comet Barnard.

Observations made on board the s.s. "Neto," by Captain Wm. G. Browne. Ship's position, Lat. 31° 54′ N.; Long. 67° 53′ W.

	h	m	s					
Dec. 4	21	49	25	Nucleus to *Arcturus*	24°	21′	20″
		57	13	„ „ *Dubhe* ...	66	33	0
	22	6	4	„ „ *Spica* ...	47	32	20

Note on the Electric Illumination of the Armagh Refractor.

By J. L. E. Dreyer, Ph.D.

As inquiries have been made from several sides about the system of electric illumination adapted to the 10-inch Refractor at the Armagh Observatory by Mr. Grubb, it may be of use to give a short description of it.

The principal difficulty of connecting the eyepiece and other parts of an Equatorial with a battery is the necessity of the observer being able to turn the telescope about, and even to reverse the instrument, without getting it entangled with the connecting wires. This difficulty Mr. Grubb has obviated in a very neat manner by letting the current pass through two insulated brass rings, one of which is attached round the upper end of the polar pillar, and the other round the end of the Declination axis away from the telescope. The current passes from these rings through

brass combs sliding on them, and moving with the telescope respectively in Right Ascension and in Declination. The rings are kept clean by being from time to time rubbed with sand-paper.

The bichromate battery is placed in the porch to the east of the dome, and the wires are carried under the floor. One wire ends in a binding screw on the base casting of the Equatorial; the other passes through the base, along the outside of the polar pillar to the first of the above-mentioned rings. From the comb sliding on this the wire passes to the ring on the Declination axis; and from the comb sliding on this a wire runs along the counterpoise to the end of the Declination axis, through this and out through the "cradle" of the telescope down to the eye-end of the latter. I have here fixed a commutator, with four holes in it; by sticking a brass peg into one of these the current is sent to the lamp giving bright field illumination, or to the lamp illuminating the wires on a dark field, or to the lamp illuminating the Declination circle, or to a small hand-lamp used for throwing light on the micrometer and the note-book. From each of these lamps a wire goes to some metallic part of the telescope. The bright wire lamp is enclosed in a small brass cylinder on the micrometer, while the bright-field lamp is placed at the side of the tube opposite the Declination axis, the light being reflected down to the eyepiece by a very small central mirror on an arm which the observer, if he wishes, can put out of the way of the pencil of light from the object-glass by pushing a rod which goes down to the eye-end. The hand-lamp consists of a short brass tube with a lens at one end, and closed at the other end by a piece of wood, through which pass the wires and an ebonite rod carrying the lamp; when not in use it hangs on one of the arms to which the finder is attached.

There is no arrangement for reading the R.A. circle from the eye-end: the observer has to stand on one of two steps east and west of the pier, and reads the circle by means of a magnifying lens and an electric lamp placed in a short tube, which, when not required, hangs on a wire holder on the south end of the pier. From this lamp an "earth wire" goes to the base of the telescope mounting, and contact is made simply by resting the brass tube against an uncovered portion of the principal wire from the battery.

The incandescent lamps are from Laing, Wharton & Down, 8 and 9 Holborn Viaduct, London; the glass globes are $\frac{7}{16}$ of an inch in diameter. The bichromate battery has four cells, but only three are required for the micrometer, and one or two would be enough for illuminating the circles. The cells are very large, the glass jars being 9 inches high and 6 inches in diameter. To the metallic lids are fastened four carbons, $6\frac{1}{2}$ by $2\frac{1}{2}$ inches, and the zinc plate is 9 inches by 3 inches. By keeping the zinc plates lifted above the acid when not in use they last a long time. The whole arrangement has been found extremely convenient and clean.

Meteors with Curved Paths. By W. F. Denning.

The term "erratic" applied by Mr. Hopkins to such meteors as display curved paths appears to me inappropriate. Erratic meteors are usually understood to refer to such of these bodies as belong to unknown systems, and are therefore synonymous with sporadic meteors. The title has also been employed to denote meteors which, though probably emanating from known showers, exhibit a certain discordance in their directions, though such discordance may have been induced by perturbations exercised upon them far beyond our atmosphere, and has nothing to do with the curved paths they sometimes pursue when under ignition. The term adopted by Mr. Hopkins is not expressive of the peculiarity to which he refers it. Such words as devious, sinuous, deflected, or tortuous meteors would be preferable, as conveying a distinct idea of the anomalous flights alluded to.

As a rule, I believe the alleged crooked paths are nothing more than mere impressions. The curious flickering in the light of individual meteors often giving rise to considerable alternations in their apparent brilliancy, combined with the fact that these phenomena rarely last long enough to ensure a steady view, occasion the idea of curved flights. The observer is seldom looking towards the exact place of a meteor's course, and the glimpse he obtains is more or less hurried, imperfect, and erroneous.

On December 20, 1886, $13^h\ 11^m$, I was watching for shooting stars and looking towards the immediate region of *Gemini* and *Cancer*, when suddenly a brightish meteor shone out north of β *Leonis*. Instantly directing my eyes to the spot, I caught the end-course well, and received a very strong impression that the path was much crooked or curled, but about $1\frac{1}{2}$ sec. later a bright streak of phosphorescence came out on the course of the meteor, and I saw it was perfectly straight along its whole length. My idea as to the bent path was therefore quite illusory, and due to the scintillations of the meteor in its rapid flight which I had seen but imperfectly. I may add, that of some thousands of meteor streaks and trains observed here at various times very few have shown decided curvature.

In 1885, out of a total of 1,334 meteors recorded (omitting Andromedes of November 27), I noticed four which were conspicuously curved. In 1886 I saw 1,431 meteors, of which about fifteen exhibited the same peculiarity in a striking degree. One of the best examples of these was recorded on December 25, 1886, $8^h\ 22^m$. The meteor was 3rd mag. and moved very slowly